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PROVISIONAL INTELLIGENCE REPORT

INPUT REQUIREMENTS FOR THE PRODUCTION OF NAVAL GUNS AND MOUNTS IN THE USSR

CIA/RR PR-92
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CENTRAL INTELLIGENCE AGENCY

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CIA/RR PR-92

(ORR Project 35.243)

NOTICE

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FOREWORD

This report is concerned with the input requirements for the production of naval guns and mounts required to outfit new naval construction in the USSR. Guns with bores of less than 20 millimeters are not included in the estimates. The report also excludes discussion of such related items as ammunition, mine warfare equipment, antisubmarine warfare equipment, torpedo tubes, fire-control equipment, and electronic devices.

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(ORR Project 35.243)

INPUT REQUIREMENTS FOR THE PRODUCTION OF NAVAL GUNS AND MOUNTS IN THE USSR

Summary*

The USSR has ample raw materials and resources for the production of the estimated 525 naval gun assemblies required annually during 1951-55 to outfit Soviet naval construction. Since this amount is only 4 percent of the estimated annual production of artillery pieces in the USSR, only a small segment of the Soviet armaments plant capacity would be utilized. When other inputs are compared with available resources, the relations can be stated in fractions of 1 percent, the highest being 0.25 percent.

I. Introduction.

Soviet naval guns** and mounts are produced in plants subordinate to the Ministries of Defense Industry and Shipbuilding. There is no evidence that naval armaments constitute more than a small part of any plant's total production.

The annual production of artillery pieces in the USSR is estimated to be about 13,000 units. 1/*** In contrast, the average annual re-

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 1 October 1954.

** In this report the term gun will designate only the tube or barrel of the weapon. When reference to the complete weapon is intended, the terms gun and mount, gun assembly, or simply assembly will be used. These inclusive terms cover the barrel, stand, and all gun and mount components that rotate with the weapon in train, including armor.

*** Footnote references in arabic numerals are to sources listed in Appendix C.

quirement for naval gun assemblies* is estimated to be approximately 525 units, or 4 percent of the total estimated production.** This low percentage is in accord with inventory estimates. In January 1954 the USSR had about 126,000 artillery pieces and self-propelled guns of 76 millimeters (mm) and larger. 2/ An inventory of weapons installed on Soviet naval vessels in service in May 1953 3/ indicates that Soviet naval vessels are armed with approximately 2,100 naval guns of 76 mm and larger, or less than 1.7 percent of the total inventory of artillery pieces in the USSR.

Thirteen plants are believed to be currently engaged in artillery production in the USSR. 4/ These plants have a potential annual capacity of about 160,000 weapons. 5/ Although naval guns and mounts are more complex than army artillery, only a small percentage of this capacity would be required for the production of naval weapons.

II. Input Requirements for Naval Guns and Mounts.***

During 1951-55, the naval gun and mount requirements for new Soviet naval construction averaged 11.6 million pounds annually. This total finished weight comprises roughly 60 percent alloy steel, 31 percent carbon steel, 5 percent copper, and 3 percent zinc. Aluminum, tin, and other alloying materials constitute the remaining 1 percent. These amounts represent insignificant percentages of the available supply.

The total annual input requirements for Soviet naval guns and mounts are shown in Table 1.**** The average annual input requirements are compared with the total available supply in the USSR in Table 2.*****

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* This average is taken for guns of 20 mm and larger, 1951-55.
** See Appendix A for the basis of these estimates.
*** For derivation of estimates see Appendix A.
**** Table 1 follows on p. 3.
***** Table 2 follows on p. 4.

Table 1

Total Annual Input Requirements for Soviet Naval Guns and Mounts a/
1951-55

Input	1951	1952	1953	1954	1955
Carbon Steel (Thousand Pounds)	8,133	10,676	5,939	8,541	7,043
Alloy Steel (Thousand Pounds)	14,120	20,349	12,088	17,703	12,799
Copper Alloy (Thousand Pounds) b/	186	262	192	286	258
Unalloyed Copper (Thousand Pounds)	36	49	25	37	28
Foundry Products (Thousand Pounds) b/	1,766	2,468	1,407	2,038	1,564
Aluminum (Thousand Pounds)	24	37	19	27	17
Total Material Requirements (Thousand Pounds)	24,265	34,341	19,670	28,632	21,709
Direct Labor (Thousand US Man-Hours	8,486	11,037	7,092	9,746	8,446
Coal (Thousand Short Tons)	70	102	55	80	56
Petroleum (Thousand Gallons)	676	981	526	772	539
Natural or Producer Gas (Million Cubic Feet)	210	305	163	240	167
Electric Power (Thousand KWH)	30,143	43,733	23,442	34,386	23,979

a. Inputs of tin and zinc are negligible except as used in alloy metals. No lead or lumber are used, and inputs of rubber are negligible.

b. For the purpose of comparing annual input requirements with the available supply of resources in the USSR (Table 2), copper alloy will be assumed to be naval brass containing 60 percent copper, 0.75 percent tin, and 39.25 percent zinc, by weight. Foundry products will be assumed to be manganese bronze containing 58.5 percent copper, 1.0 percent tin, 39.4 percent zinc, and 1.1 percent of other alloying materials, by weight.

Table 2

Comparison of the Average Annual Naval Gun and Mount Input Requirements with the Available Supply of Resources in the USSR a/
1953

Input	Total National Supply		Naval Gun and Mount Requirements		
	Metric Tons	Thousand Pounds	Metric Tons	Thousand Pounds	Percent
Carbon Steel (Finished)	22,080,000	48,680,000	3,659	8,066	0.02
Alloy Steel (Finished)	5,520,000	12,170,000	7,036	15,511	0.13
Copper (Primary and Secondary)	353,000 6/	778,000	571	1,258	0.16
Aluminum (Primary and Secondary)	390,000	860,000	11	24	Negligible
Tin	11,000	24,000	9	20	0.08
Zinc	150,000	330,000	373	820	0.25
Other Alloying Materials	N.A.	N.A.	9	20	N.A.
Total Material Requirements	N.A.	N.A.	11,668	25,719	
Other Input Requirements					
Direct Labor	N.A.	N.A.	4,480 b/ (US Man-Years)		N.A.
Coal (Hard and Lignite)	320 7/ (Million Metric Tons)	352.5 (Million Short Tons)	33,000 (Metric Tons)	36,375 (Short Tons)	Negligible
Petroleum (Crude Oil)	49.6 8/ (Billion Metric Tons)		Negligible		Negligible
Natural Gas	5,488 (Million Cubic Meters)	194 (Billion Cubic Feet)	6 (Million Cubic Meters)	217 (Million Cubic Feet)	Negligible
Electric Power	133,000 (Million KWH)		31 (Million KWH)		0.023

a. No lead or lumber are used and the inputs of rubber are negligible.
b. Computed on the basis of 2,000 man-hours per man-year.

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APPENDIX A

METHODOLOGY

1. Procedure.

The estimates of input requirements for the production of naval guns and mounts are based on a study of Soviet naval weapons and a selection of US counterparts. Gun assemblies currently in use on Soviet vessels are described in Section 2 of this appendix, and comparison is made with similar US weapons. On the basis of this comparison, the weights of the various Soviet gun assemblies are calculated.

The yearly requirements of the Soviet Navy for naval guns and mounts are treated in Section 3. The numbers and types of assemblies are listed for each class of vessel, and the armament weights are totaled for representative ships of each class. These totals, multiplied by annual ship production estimates (Table 5*), give the naval gun and mount requirements in pounds per year (Table 6**).

The corresponding inputs are based on analogy to US experience, adjustment being made for weight differences. Estimates of the input requirements for each type of Soviet gun assembly are given in Tables 8-17,*** and Tables 18-25**** list the input requirements for the total armament of each class of Soviet vessel.

By multiplying the input requirements per weapon (Tables 8-17) by the number of weapons needed to outfit new construction (Appendix A, Section 3,a and b), it is possible to arrive at an estimate of the total annual input requirements for 1951-55. The results are stated in Table 1.*****

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* P. 16, below.
** P. 17, below.
*** Pp. 23-32, below.
**** Pp. 33-40, below.
***** P. 3, above.

2. Naval Guns and Mounts Used by the Soviet Navy.

More than 50 different types of naval gun assemblies are installed in Soviet naval vessels, varying in size from the 12.6-inch/44* 3-gun turret on the Cavour class OBB (Old Battleship) to the modern 12.7-mm/79 Degtyarev dual-purpose machine gun used as light antiaircraft armament on many vessels.

The following types are weapons of 20 mm or larger reported to be installed on combat vessels of recent construction:

a. 6-inch/50 3-Gun Turret.

Turrets with 3 guns of about 6-inch/50 are reported to be the main battery on the Chapayev and Sverdlov class Soviet cruiser. These guns appear to be of modern construction and vary in length from 47 to 55 calibers. 9/ The turrets themselves are of welded construction. Estimates of the turret dimensions and those of the comparable US 6-inch/47 3-gun turret are given in Table 3.**

Protective hoods are provided for turret rangefinders and pointer-trainer periscopes. The guns are widely spaced and capable of separate elevation. 10/ There is no evidence of an automatic loading system, except for the large size of the turret. Each turret is equipped with a broad-base rangefinder with an estimated base length of 8.5 meters, 11/ and radomes are installed on turrets 2 and 3. 12/

The estimated turret dimensions indicate that the turret armor and frame weighs approximately 25,000 pounds less than that of the US 6-inch/47 3-gun turret. If the weights of other turret components are equal, the total weight of the Soviet turret would be 345,000 pounds.

b. 4.8-inch/46 Twin Gun and Mount.

Assemblies of this estimated size and caliber are installed on the Otlichnyy and Skoryy class destroyers. 13/ They are vastly superior

* In heavy artillery, the length of the bore is often expressed in calibers. For example, a 6-inch/50 (caliber) gun means that it has a bore diameter of 6 inches and a length of 300 (6 x 50) inches.
** Table 3 follows on p. 7.

Table 3

Comparison of the Estimated Dimensions
of the Soviet 6-Inch/50 3-Gun Turret
with the US 6-Inch/47 3-Gun Turret

Description	US 6-Inch/47 3-Gun Turret	Soviet 6-Inch/50 3-Gun Turret
End of Barrel to Back of Turret (Feet)	42 a/	46 b/
Lower Edge of Turret (Feet)	25.42 a/	30 b/
Upper Edge of Turret (Feet)	22 a/	27 b/
Greatest Width (Feet)	19.75 c/	23 b/
Maximum Depth (Feet)	8.08 a/	9.83 b/
Projection of Barrel (Feet)	18	17.5 b/
Armor Thickness		
Front (Inches)	6.5 c/	3 b/
Top (Inches)	3 c/	1.5 b/
Sides (Inches)	3 and 1.5 c/	1.5 b/
Back (Inches)	1.5 c/	1.5 b/
Estimated Weight of Armor and Armor-Supporting Structure (Rotating Sections Only) Based on Above Dimensions (Pounds)	221,000	195,000

a. 14/
b. 15/
c. 16/

to the older single 5.1-inch/50 gun assemblies of earlier destroyers. 17/ The guns are capable of being separately elevated. 18/ Reports on maximum elevation vary from 45° 19/ to 85°. 20/ Although reports state that ammunition is supplied over the deck through an opening in the rear of the mount, 21/ the Russians have undoubtedly devised some sort of ammunition hoist to supply this assembly from below decks. These twin automatic-follow assemblies 22/ are dual-purpose but are probably not equipped with automatic loading. 23/

For the purpose of computing input data, this gun assembly is assumed to weigh 88,500 pounds.*

c. 3.9-Inch/56 Dual-Purpose Twin Gun and Mount.

Gun assemblies of this approximate bore and caliber form the secondary battery of the Sverdlov class cruisers. Although they were originally reported to be 3.9-inch/56 guns, 24/ the exact bore and caliber is still undetermined. 25/

These gun assemblies are of the base ring type and are large and unusually long, with the trunnion axis located well abaft the axis of rotation of the mount. Access doors for personnel are located in the sides of the gun house, forward of the trunnion axis, suggesting a complex and space-consuming power drive and automatic loading. 26/ A third opening about 3.5 feet wide, located in the rear plate of the mount shield, is used for the ejection of empty cartridges from the mount. 27/ The mounts are thought to be electrically driven, auto-follow, and triaxially stabilized. 28/ Beneath the mount is a barbette-like structure, believed to serve as an ammunition handling room. Radomes similar to those on main battery turrets 2 and 3 of the Chapayev and Sverdlov class cruisers are installed on the right front corner of each of these secondary battery assemblies. These radomes are believed to contain fire-control radar operating in the S-band with a primary function of surface fire-control. 29/

This gun assembly is assumed comparable with a US twin gun and mount of 120,000 pounds.** If the Soviet and US assemblies were similar in all respects except for bore and caliber, the Soviet assembly would weigh an estimated 72,000 pounds, were its size proportional to its bore. However, it is reported as large and unusually long, 30/ and has features not found in the US assembly, such as a radome, a triaxled gun carriage, and possibly automatic loading. It is estimated, therefore, that the Soviet gun assembly weighs close to 90,000 pounds. A comparison of the estimated dimensions shows that the Soviet gun and

* This assembly is assumed comparable to the 98,300-pound, 5-inch/38, dual-purpose, twin, enclosed base ring type assembly installed on US destroyers. The weight has been adjusted for difference in caliber.
** The US light cruiser 5-inch/38 dual-purpose twin assembly. Mark 32, Model 3, with a .75 inch shield.

mount is about 8 feet longer and 3 feet narrower than the US gun and mount. Estimates of both Soviet and US gun and mount dimensions are shown in Table 4.

Table 4

Comparison of the Estimated Dimensions
of the Soviet 3.9-Inch/56 Gun Mount
with the US 5-Inch/38 Gun Mount

Description	US 5-Inch/38 Gun Mount	Soviet 3.9-Inch/56 Gun Mount
End of Barrel to Back of Shield (Feet)	25 a/	28 b/
Lower Edge of Shield (Feet)	14 a/	22 b/
Depth of Shield (Feet)	10 a/	10 b/
Width (Feet)	15 a/	12 b/
Projection of Barrel (Feet)	Approximately 12 a/	10.75 b/
Shield Thickness (Inches)	0.75 a/	0.50 b/
Shield Area (Approximate) (Square Feet)	850	1,170
Shield and Shield Support Weight (Pounds)	33,700 a/	29,800
Total Gun and Mount Weight (Pounds)	120,000 a/	90,000

a. 31/
b. 32/

d. 3.9-Inch/56 Dual-Purpose Single-Gun Assembly.

This assembly forms the main battery of the newer Soviet coastal destroyers and mine vessels. 33/ Photographs show that the rear of the mount is open to the weather, possibly for over-the-deck ammunition supply, and that it is a pedestal-type gun mount.

A Soviet document of 1940 describes a Universal B-34 naval gun of 3.9-inch/55, with a weight of 22,266 pounds and a maximum elevation of 85°. 34/ For the purposes of computing input data, this naval gun and mount will be compared with a similar US weapon* of 43,000 pounds, allowances made for the difference in weight.

e. 3.9-Inch/51 Single, Open, Wet Type Gun and Mount.

This submarine type gun and mount is used on the large oceangoing K class of Soviet submarine. 35/ A Soviet document describes a 3.9-inch/50 Deck, B-24 base-mounted assembly without mount plate and armor with an over-all weight of 12,400 pounds. 36/ The Soviet gun and mount in use at present is similar to this gun and mount. For the purpose of computing input data, this gun and mount will be compared with a US** assembly of 12,600 pounds, making allowance for the small weight difference.

f. 3-Inch/55 Dual-Purpose, Twin, Enclosed Gun and Mount.

There is a 3-inch/55 twin, enclosed gun and mount in the after superstructure of the Otlichnyy and Skoryy classes of Soviet destroyers. These weapons appear to be an adaptation of the Soviet single, dual-purpose, universal naval gun, designated Mark 34-K, which was modernized in 1939. The guns are capable of a high angle of elevation while maintaining the normal elevation of the trunnions for firing at low elevation. 37/

The weight of the Mark 34-K single assembly has been reported as 10,913 pounds. 38/ Assuming that this is correct, a factor of 1.80*** gives an estimate of 19,640 pounds for the total weight of the twin enclosed mount, 4,600 pounds 39/ of this total being the weight of the shield. In computing input data, this assembly will be compared with

* US 5-inch/38 dual-purpose, single, enclosed, base ring type mount.
** US 5-inch/25 single-purpose, open, wet, pedestal-type, Mark 40, Model 0 assembly.
*** An analysis of the US 40-mm twin and single, 3-inch/50 twin and single, and 5-inch/38 twin and single assembly weights shows that the average weight relationship between single and twin open assemblies is 1 : 1.82, and that the weight ratio between single and twin enclosed mounts is 1 : 1.80.

the US 3-inch/50 single open mount of 8,280 pounds, using a factor of 1.82 times US inputs. An input of 5,750 pounds* is added for the shield.

g. 3-Inch/55 Dual-Purpose, Single, Shielded, Pedestal-Type Assembly.

It has been reported that a mount of this or a similar type is used as the main battery on some of the larger Soviet patrol craft. 40/ This assembly, designated Mark 34-K, was modernized in 1939. It is capable of a high angle of elevation while maintaining the normal elevation of the trunnions for firing at low elevation. 41/

The weight of the Mark 34-K assembly has been reported as 10,913 pounds. 42/ This figure is reasonable, since the US single, open, manual drive, 3-inch/50 gun and mount weighs approximately 8.280 pounds, and the Soviet shield would account for the difference in weight. For computing input data, this assembly will be compared with the US 3-inch/50 assembly, using a factor of 1.00 x US inputs, plus an input of 3,291 pounds of steel (1.25 x 2,633 pounds) for the shield.

h. 45-mm Single, Open Mount and Gun.

The 1.8-inch/45 dual-purpose Universal naval gun is used on Soviet submarines as well as merchant vessels. It forms the main armament on the small submarines and the secondary armament on the larger submarines. This gun was modernized in 1938. Changes made at that time included addition of semiautomatic devices, alteration of the manner of securing the gun to the deck, alteration of the azimuth circle, and the like. It is used primarily as a short-range antiaircraft gun, but it can also be used against surface targets. 43/ The breechblock is of the vertical sliding wedge type and is semiautomatic. When mounted on submarines, the gun is hermetically plugged by means of a cork which will keep the barrel dry down to 100 meters below the surface. 44/

* A review of US manufacturers' bills of material for naval gun shields produced during World War II shows that the average ratio between finished shield weight and gun shield input weight is about 1:1.25 and that the shield is about 20 percent carbon steel, 80 percent alloy steel. Thus, 4,600 pounds times 1.25 equals 5,750 pounds.

In photographs this assembly appears to be of the pedestal type, air-cooled, manually operated, and of very simple construction. Its simple construction is apparent when its reported weight of 1,124 pounds 45/ is compared with that of the US 40-mm M3 single air-cooled mount of 2,400 pounds. 46/ For the purpose of computing input data, and because of the difference in characteristics of the US 40-mm M3 and the Soviet 45-mm, the input study must be made on the basis of individual gun and mount components. The estimated factors for each of the components is as follows:

Component	Factor
Barrel	1.50 x US Inputs
Machine Gun Mechanism	0.20 x US Inputs
Carriage and Stand	0.40 x US Inputs
Miscellaneous	0.37 x US Inputs

i. 37-mm Twin Gun and Mount.

The Sverdlov class cruiser has 32 of these guns mounted in 16 twin mounts. Each assembly is partially surrounded by a light splinter shield, estimated to be about .25 inch thick. 47/

The gun and mount closely resembles the US 40-mm Mark 1 twin gun and mount, except that the assembly does not have a power drive. 48/ The US assembly weighs 13,200 pounds with the power drive installed. 49/ Without the power drive its weight would be approximately 11,500 pounds. This would also be a close estimate of the weight of the Soviet gun and mount. Therefore, for the purpose of computing input data, the input requirements of the US Mark 1 twin gun mount without power drive are used directly.

j. 37-mm Single Gun and Mount.

This mount is used as the close antiaircraft defense on the Otlichnyy and Skoryy class Soviet destroyers. It has the same general characteristics as those reported for the 37-mm twin gun and mount described above, except that it appears to have slightly greater shield protection. It has been reported as using a 5-round clip and having the same type mount as the new 57-mm (Bofors) gun. 50/

Its reported weight is 4,430 pounds. 51/ For the purpose of computing input data this mount will be compared to the US 40-mm single M3, without power drive (2,440 pounds) using a factor of 1.0 x US inputs plus 2,488 pounds (1,990 x 1.25) of steel for the shield, of which 20 percent is carbon steel and the remainder alloy steel. The thickness of the shield is estimated as approximately .25 inch.

3. Annual Requirements of the Soviet Navy for Guns and Mounts.

The estimate of the requirements of the Soviet Navy for guns and mounts is based entirely on estimates of the annual average rate of construction of naval vessels for the period 1951-55. No attempt has been made to estimate the requirements for regunning or the installation of new equipment on older classes of vessels now in commission. No allowance has been made for the requirements for the production of spare parts.

The estimated weight of each mount and turret includes only the weight of those components that rotate with the mount plus the stand in the case of pedestal and base ring type mounts.

a. Requirements per Vessel. 52/

The gun and mount requirements for combat-type Soviet naval vessels recently constructed are described below. The class of vessel listed after each vessel type is the class of vessel believed to be most closely representative of the current (post 1950) Soviet naval shipbuilding program. The methods used in arriving at unit weight estimates of the different types of armament are described in 2, above.

(1) Cruisers (CL), Sverdlov Class.	Armament Weight (Pounds)
4 6-inch/50 (Estimated) 3-Gun Turrets	1,380,000
6 3.9-inch/56 Twin Guns and Mounts	540,000
16 37-mm Antiaircraft Twin Guns and Mounts	184,000
Total	2,104,000

(2) Destroyer Leaders (DL), Unknown Class.

Until further details are known about this new type of construction, armament characteristics will be assumed to be the same as the Skoryy class Soviet destroyer.

(3) Destroyers (DD), Skoryy Class.	Armament Weight (Pounds)
2 4.8-inch/46 Twin Guns and Mounts	177,000
1 3-inch/55 Twin Gun and Mount	19,600
7 37-mm Single Guns and Mounts	31,000
Total	227,600

(4) Coastal Destroyers (DC), Modified T-41 Class.	Armament Weight (Pounds)
4 3.9-inch/56 DP Single Guns and Mounts	89,100
6 37-mm Single Guns and Mounts	26,600
Total	115,700

(5) Destroyers (DC), Unknown Class.

Until further details are known about this new type of construction, armament characteristics will be assumed to be the same as the Modified T-41 Class of Coastal Destroyer.

(6) Submarines (SS), Long Range. (Armament Estimates Based on the K-1 Class)	Armament Weight (Pounds)
2 3.9-inch/51 Single Guns and Mounts	24,800
2 45-mm Single Guns and Mounts	2,248
Total	27,048

(7) Submarines (SS), Medium Range. (Armament Estimates Based on the Shch IV Class)	Armament Weight (Pounds)
2 45-mm Single Guns and Mounts	2,248
Total	2,248

(8) Submarines (SS), Coastal. (Armament Estimates Based on the MV Class)	Armament Weight (Pounds)
1 45-mm Single Gun and Mount	1,124
Total	1,124

(9) Patrol Craft (PC), Kronshtadt Class	Armament Weight (Pounds)
1 3-inch/55 Single Gun and Mount	10,913
2 37-mm Single Guns and Mounts	8,860
Total	19,773

(10) Mine Craft (600 to 900 Tons Displacement). (Armament Estimates Based on the T-43 Class of AM)	Armament Weight (Pounds)
2 3.9-inch/56 Single Guns and Mounts	44,532
Total	44,532

b. Total Annual Requirements.

(1) General.

The Soviet requirements for naval guns and mounts are directly dependent upon the number and types of naval vessels constructed each year.

Estimates of Soviet naval vessel construction for the years 1951-55 are given in Table 5.

Table 5

Estimated Soviet Naval Vessel Construction 53/
1951-55

Type	Class	1951	1952	1953	1954	1955
CL	Sverdlov	2	4	2	3	1
DL/DD	Unknown	0	0	1	11	12
DD	Skoryy a/	24	26	2	0	0
DC	T-41	0	1	0	0	0
	Unknown	0	0	16	13	14
SS	Long Range	6	12	26	41	46
	Medium Range	1	0	0	0	0
	Coastal	10	0	0	0	0
PC	Kronshtadt	25	25	25	25	25
AM	T-43	20	20	20	20	20

a. Up to eight additional DD may exist, delivered to the fleet in 1953 and earlier.

(2) Requirements by Weight.

The estimated naval gun and mount requirements for each Soviet naval vessel are described in Section 3 of this methodology, and estimates of the annual rate of construction of Soviet naval vessels are given in Table 5. The estimates of the total annual gun and mount requirements of the USSR are shown in Table 6.*

(3) Requirements by Weapon.

Another method of computing total annual requirements is by determining the number of weapons required to outfit those naval vessels

* Table 6 follows on p. 17.

Table 6

Estimated Soviet Naval Gun and Mount Requirements
1951-55

Pounds

Type	Class	1951	1952	1953	1954	1955
CL	Sverdlov	4,208,000	8,416,000	4,208,000	6,312,000	2,104,000
DL/DD	Unknown	0	0	228,000	2,504,000	2,731,000
DD	Skoryy	5,462,000	5,917,000	455,000	0	0
DC	T-41	0	115,700	0	0	0
	Unknown	0	0	1,851,000	1,504,000	1,620,000
SS	Long Range	162,000	325,000	703,000	1,109,000	1,244,000
	Medium Range	2,000	0	0	0	0
	Coastal	11,000	0	0	0	0
PC	Kronshtadt	494,000	494,000	494,000	494,000	494,000
AM	T-43	891,000	891,000	891,000	891,000	891,000
Total		11,231,000	16,159,000	8,830,000	12,813,000	9,084,000

Average Annual Requirements: 11,623,000 pounds per year (1951-55).

being constructed. The average annual (1951-55) Soviet requirements by weapons are given in Table 7.* These estimates are based on the estimated average annual construction rates of Soviet naval vessels and a description of the armament installations of those vessels.

4. Input Requirements of Soviet Naval Guns and Mounts.

a. General.

Inputs for each Soviet naval gun and mount were derived by comparing the Soviet gun assembly with US equipment of similar function and design and multiplying the US inputs per thousand pounds of finished weight by the estimated weight of the Soviet weapon in thousands of pounds.

* Table 7 follows on p. 18.

Table 7

Estimated Average Annual Soviet Naval Weapons Requirements
1951-55

Weapon	1951	1952	1953	1954	1955
6-Inch/50 3-Gun Turret	8	16	8	12	4
4.8-Inch/46 Twin Gun and Mount	48	52	6	22	24
3.9-Inch/56 Twin Gun and Mount	12	24	12	18	6
3.9-Inch/56 Single Gun and Mount	40	44	104	92	96
3.9-Inch/51 Single Gun and Mount	12	24	52	82	92
3-Inch/55 Twin Gun and Mount	24	25	3	11	12
3-Inch/55 Single Gun and Mount	25	25	25	25	25
45-mm Single Gun and Mount	24	24	52	82	92
37-mm Twin Gun and Mount	32	64	32	48	16
37-mm Single Gun and Mount	218	238	167	205	218
Total	443	536	461	597	585
Average Annual Requirements (1951-55)	524 Gun Assemblies Per Year				

The derived inputs and their definitions are as follows:

(1) Carbon Steel.

Carbon steel includes all steel customarily so classified and not covered by the definition of alloy steel. 54/

(2) Alloy Steel.

Alloy steel includes any steel in which the iron content exceeds 50 percent and in which the ranges given for alloying elements exceed one or more of the following limits: manganese in excess of 1.65 percent; silicon in excess of 0.60 percent; copper in excess of 0.60 percent; and aluminum, boron, chromium, cobalt, columbium, molybdenum, nickel, tantalum, titanium, tungsten, vanadium, zirconium,

or any other alloying elements in any amount specified or known to have been added to obtain a desired alloy effect. 55/ Stainless steel is also included in this category.

(3) Copper Alloy.

Copper alloy includes all alloys containing 40 percent or more copper by weight. This includes the brasses, bronzes, and special alloys such as copper nickel, nickel silver, beryllium copper, and the like. 56/

(4) Unalloyed Copper and Copper Wire Mill Products.

Unalloyed copper and copper wire mill products include 100 percent copper, plus copper containing minute or fractional percentages of other elements. This includes electrolytic, deoxidized, silver bearing, arsenical, and leaded copper. Wire mill products are bare, insulated, armored or copper-clad wire (containing 20 percent or more copper), or cable for electrical conduction made from copper or copper-base alloys. The reported weight includes only the weight of the metal content.

(5) Foundry Products.

Foundry products include cast copper or copper-base alloy shapes or forms suitable for ultimate use without rolling, drawing, or extruding. This process may include the removal of gates, risers, and sprues, and sandblasting, tumbling, or dipping, but does not include further machining or processing.

(6) Aluminum.

Aluminum includes commercial aluminum and aluminum base alloys, which, in general, can be defined as containing 85 percent or more of aluminum. Aluminum as an alloying element in other than aluminum base alloys is not included.

(7) Lead.

Lead includes the lead content of antimonial lead, solder, and paint.

(8) Zinc.

Zinc includes zinc dust and the zinc content of zinc base alloys which, in general, are defined as containing 80 percent or more zinc. The category excludes the zinc content of galvanized products purchased as such and the zinc content of other alloys, except as noted.

(9) Tin.

Tin excludes tin plate and terne plate as well as the tin content of copper alloys, except as noted.

(10) Rubber.

Rubber includes both natural and synthetic rubbers. It does not include rubber used as insulation on electric cable.

(11) Labor.

Labor is an estimate of the direct labor required in the US to transform the raw material from the mill and foundry stage up to and including the assembly, inspection, and testing of the final product. No attempt has been made to convert these US man-hour requirements to Soviet requirements, because there are not sufficient data to permit definite conclusions on Soviet labor productivity since 1940. 57/ Further analysis must wait for the release of additional information by the Russians. These US direct labor requirements do not give a true picture of the total labor required nor take into account the labor required for management, development, design, general office work, social services, equipment servicing, or inspection. An analysis of the personnel employed by any large manufacturer would probably reveal that the workers involved in direct production represent only 40 to 60 percent of the total number employed. 58/

In general, direct man-hour requirements per thousand pounds of finished weight vary directly with the bore of the gun and inversely with the weight of the armor. In the US, requirements vary from approximately 120 man-hours per thousand pounds of finished weight on the 16-inch turrets to 1,500 man-hours on some of the new 3-inch and 5-inch rapid fire guns and mounts.

(12) Other Inputs.

Data on inputs of coal, petroleum, natural or producer gas, electric power, and lumber were based on estimates of the input requirements for US ground weapons. Until better information is available, these figures will serve as rough estimates of the quantities of these products required in the production of naval surface weapons.

In general, the relationship between raw material inputs and the total finished weight of a US gun and mount assembly is as follows 59/:

Type of Input	Percent
Total Inputs	160 to 380
Steel (Carbon and Alloy)	150 to 345
Copper Alloy	0.6 to 12
Copper and Wire Mill Products	0.1 to 0.8
Foundry Products	7 to 30
Aluminum	0 to 0.9
Lead and Zinc	0
Tin	0 to 0.0003
Rubber	0 to 0.03

b. Inputs Per Weapon.

Estimates of the input requirements for each of the weapons believed to be installed on Soviet combat-type naval vessels of recent construction are given in Tables 8-17.*

In all cases the estimates of the raw material requirements are based on US manufacturers' bills of material for the numerous subassemblies required for similar US guns and mounts. For example, on the US 6-inch/47 3-gun turret, used as a basis for estimating the Soviet requirements for their 6-inch/50 3-gun turret, input data were obtained on 17 different major subassemblies of that weapon. For the sake of brevity, only the summation of that data is shown in the following tables. In some cases the same component was produced by

* Tables 8-17 follow on pp. 23-32.

several different manufacturers to the same specifications, and reports on the material required varied by as much as 50 percent. This variation is caused by differences in plant facilities, manufacturing processes employed, urgency of the order, and the quantity of the lot to be produced. In these cases the average of the various manufacturers' requirements was used.

Labor requirements in direct man-hours are based on US Navy, Bureau of Ordnance, estimates of labor costs for similar US weapons. Inputs of coal, petroleum, natural or producer gas, electric power and lumber are based on input requirements of US ground weapons. Inputs of lead, zinc, and lumber are negligible.

Table 8

Estimated Input Requirements
for the Soviet 6-Inch/50 3-Gun Turret a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	165.19	56,991
Alloy Steel (Pounds)	1,484.33	512,094
Copper Alloy (Pounds)	7.73	2,667
Unalloyed Copper (Pounds)	1.53	528
Foundry Products (Pounds)	104.44	36,032
Aluminum (Pounds)	3.01	1,038
Tin (Pounds)	0.02	7
Rubber (Pounds)	0.01	3
Total Material Requirements (Pounds)	1,766.26	609,360
Direct Labor (US Man-Hours)	300	103,500
Coal (Short Tons)	6.96 b/	2,401
Petroleum (Gallons)	67.0 b/	23,115
Natural or Producer Gas (1,000 Cubic Feet)	20.9 b/	7,210
Electric Power (KWH)	3,000.0 b/	1,035,000

a. Estimated unit weight: 345,000 pounds. Estimates based on the US 6-inch/47 3-gun turret, CL-55 class.
b. 60/.

Table 9

Estimated Input Requirements
for the Soviet 4.8-Inch/46 Twin Gun and Mount a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	941.88	83,356
Alloy Steel (Pounds)	1,189.84	105,301
Copper Alloy (Pounds)	20.00	1,770
Unalloyed Copper (Pounds)	4.78	423
Foundry Products (Pounds)	185.13	16,384
Aluminum (Pounds)	2.59	229
Tin (Pounds)	0	0
Rubber (Pounds)	0.10	9
Total Material Requirements (Pounds)	2,344.32	207,472
Direct Labor (US Man-Hours)	880	77,880
Coal (Short Tons)	6.96 b/	616
Petroleum (Gallons)	67.0 b/	5,930
Natural or Producer Gas (1,000 Cubic Feet)	20.9 b/	1,850
Electric Power (KWH)	3000.0 b/	265,500

a. Estimated unit weight: 88,500 pounds. Estimates based on the US 5-inch/38 dual-purpose twin, enclosed, base ring type mount, Mark 38, Modification 1.

b. 61/.

Table 10

Estimated Input Requirements
for the Soviet 3.9-Inch/56 Dual-Purpose, Twin Gun Mount a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	941.88	84,769
Alloy Steel (Pounds)	1,189.84	107,086
Copper Alloy (Pounds)	20.00	1,800
Unalloyed Copper (Pounds)	4.78	430
Foundry Products (Pounds)	185.13	16,662
Aluminum (Pounds)	2.59	233
Tin (Pounds)	0	0
Rubber (Pounds)	0.10	9
Total Material Requirements (Pounds)	2,344.32	210,989
Direct Labor (US Man-Hours)	670	60,300
Coal (Short Tons)	6.96 b/	626
Petroleum (Gallons)	67.0 b/	6,030
Natural or Producer Gas (1,000 Cubic Feet)	20.9 b/	1,881
Electric Power (KWH)	3,000.0 b/	270,000

a. Estimated unit weight: 90,000 pounds. Estimates based on the US 5-inch/38 dual-purpose, twin, enclosed, base ring type mount, Mark 32 Modification 12.
b. 62/

Table 11

Estimated Input Requirements
for the Soviet 3.9-Inch/56 Dual-Purpose, Single Gun and Mount
Type B-34 a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	941.88	20,972
Alloy Steel (Pounds)	1,189.84	26,493
Copper Alloy (Pounds)	20.00	445
Unalloyed Copper (Pounds)	4.78	106
Foundry Products (Pounds)	185.13	4,122
Aluminum (Pounds)	2.59	58
Tin (Pounds)	0	0
Rubber (Pounds)	0.10	2
Total Material Requirements (Pounds)	2,344.32	52,198
Direct Labor (US Man-Hours)	1,260	28,055
Coal (Short Tons)	6.96 b/	155
Petroleum (Gallons)	67.0 b/	1,492
Natural or Producer Gas (1,000 Cubic Feet)	20.9 b/	465
Electric Power (KWH)	3,000.0 b/	66,798

a. Estimated unit weight: 22,266 pounds. 63/ Estimates based on the US 5-inch/38 dual-purpose, single, enclosed, base ring type gun and mount, Mark 30.
b. 64/.

Table 12

Estimated Input Requirements
for the Soviet 3.9-Inch/51 Single, Open, Wet, Pedestal-Type
Gun and Mount a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated total Requirements per Weapon
Carbon Steel (Pounds)	801.83	9,943
Alloy Steel (Pounds)	2,664.91	33,045
Copper Alloy (Pounds)	116.27	1,442
Unalloyed Copper (Pounds)	1.19	15
Foundry Products (Pounds)	245.56	3,045
Aluminum (Pounds)	0	0
Tin (Pounds)	0	0
Rubber (Pounds)	0	0
Total Material Requirements (Pounds)	3,829.76	47,490
Direct Labor (US Man-Hours)	1,360	16,864
Coal (Short Tons)	6.96 b/	86
Petroleum (Gallons)	67.0 b/	831
Natural or Producer Gas (1,000 Cubic Feet)	20.9 b/	259
Electric Power (KWH)	3,000.0 b/	37,200

a. Estimated unit weight: 12,400 pounds. 65/ Estimates based on the US 5-inch/25 single-purpose, open, wet, pedestal-type gun and mount.
b. 66/

Table 13

Estimated Input Requirements
for the Soviet 3-Inch/55 Dual-Purpose, Twin, Enclosed Gun and Mount a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	856.88 plus 1,150 pounds for shield	14,037
Alloy Steel (Pounds)	1,049.63 plus 4,600 pounds for shield	20,386
Copper Alloy (Pounds)	12.92	194
Unalloyed Copper (Pounds)	0.24	4
Foundry Products (Pounds)	79.71	1,199
Aluminum (Pounds)	0	0
Tin (Pounds)	0	0
Rubber (Pounds)	0	0
Total Material Requirements (Pounds)	1,999.39 plus 5,750 pounds for shield	35,820
Direct Labor (US Man-Hours)	1,075	21,113
Coal (Short Tons)	6.96 b/	137
Petroleum (Gallons)	67.0 b/	1,316
Natural or Producer Gas (1,000 Cubic Feet)	20.9 b/	410
Electric Power (KWH)	3,000.0	58,920

a. Estimated unit weight: 19,640 pounds (15,040 pounds plus 4,600-pound shield). Estimates based on the US 3-inch/50 dual purpose, single, open, manual drive mount, plus a 4,600-pound shield.
b. 67/.

Table 14

Estimated Input Requirements
for the Soviet 3-Inch/55 Dual-Purpose, Single, Shielded, Pedestal-Type Gun and Mount a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	856.88 plus 658 pounds for shield	7,753
Alloy Steel (Pounds)	1,049.63 plus 2,633 pounds for shield	11,324
Copper Alloy (Pounds)	12.92	107
Unalloyed Copper (Pounds)	0.24	2
Foundry Products (Pounds)	79 .71	660
Aluminum (Pounds)	0	0
Tin (Pounds)	0	0
Rubber (Pounds)	0	0
Total Material Requirements (Pounds)	1,999.39 plus 3,291 pounds for shield	19,846
Direct Labor (US Man-Hours)	1,160	12,659
Coal (Short Tons)	6.96 b/	76
Petroleum (Gallons)	67.0 b/	731
Natural or Producer Gas (1,000 Cubic Feet)	20.9 b/	228
Electric Power (KWH)	3,000.0 b/	32,739

a. Estimated unit weight: 10,913 pounds 68/ (8,280 pounds plus 2,633-pound shield). Estimates based on the US 3-inch/50 dual-purpose, single, open, manual drive mount, plus 2,633-pound shield.
b. 69/.

Table 15

Estimated Input Requirements
for the Soviet 45-mm Single, Open Gun and Mount a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	869.22	977
Alloy Steel (Pounds)	2,013.34	2,263
Copper Alloy (Pounds)	10.68	12
Unalloyed Copper (Pounds)	1.78	2
Foundry Products (Pounds)	194.84	219
Aluminum (Pounds)	0	0
Tin (Pounds)	0	0
Rubber (Pounds)	0	0
Total Material Requirements (Pounds)	3,089.86	3,473
Direct Labor (US Man-Hours)	900	1,012
Coal (Short Tons)	1.1 b/	1
Petroleum (Gallons)	11.0 b/	12
Natural or Producer Gas (1,000 Cubic Feet)	2.8 b/	3
Electric Power (KWH)	388 b/	436

a. Estimated unit weight: 1,124 pounds. 70/ Estimates based on the US 40-mm single, open, M3 gun and mount without power drive.
b. 71/.

Table 16

Estimated Input Requirements
for the Soviet 37-mm Twin Gun and Mount a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	1,196.70	13,762
Alloy Steel (Pounds)	758.25	8,720
Copper Alloy (Pounds)	15.77	181
Unalloyed Copper (Pounds)	2.19	25
Foundry Products (Pounds)	213.87	2,460
Aluminum (Pounds)	0.17	2
Tin (Pounds)	0	0
Rubber (Pounds)	0	0
Total Material Requirements (Pounds)	2,186.97	25,150
Direct Labor (US Man-Hours)	710	8,165
Coal (Short Tons)	1.1 b/	13
Petroleum (Gallons)	11.0 b/	126
Natural or Producer Gas (1,000 Cubic Feet)	2.8 b/	32
Electric Power (KWH)	388.0 b/	4,462

a. Estimated unit weight: 11,500 pounds. Estimates based on the US 40-mm Mark 1 twin gun and mount, without power drive.
b. 72/.

Table 17

Estimated Input Requirements
for the Soviet 37-mm Single Gun and Mount a/

Input	Estimated Inputs per Thousand Pounds of Finished Weight	Estimated Total Requirements per Weapon
Carbon Steel (Pounds)	1,122.95 plus 498 pounds for shield	3,238
Alloy Steel (Pounds)	1,293.85 plus 1,990 pounds for shield	5,147
Copper Alloy (Pounds)	18.03	44
Unalloyed Copper (Pounds)	1.64	4
Foundry Products (Pounds)	301.64	736
Aluminum (Pounds)	0	0
Tin (Pounds)	0	0
Rubber (Pounds)	0	0
Total Material Requirements (Pounds)	2,738.11 plus 2,488 pounds for shield	9,169
Direct Labor (US Man-Hours)	790	3,500
Coal (Short Tons)	1.1 b/	5
Petroleum (Gallons)	11.0 b/	49
Natural or Producer Gas (1,000 Cubic Feet)	2.8 b/	12
Electric Power (KWH)	388.0 b/	1,719

a. Estimated unit weight: 4,430 pounds 73/ (2,440 pounds plus 1,990-pound shield). Estimates based on the US 40-mm single M3 gun and mount, without power drive, plus 1,990-pound shield.
b. 74/.

c. Naval Surface Armament Input Requirements per Vessel.

Estimates of the input requirements for naval surface ordnance of each Soviet combat vessel of recent construction are given in Tables 18-25.* These tables are a combination of the data contained in Appendix A, Section 2, and Appendix A, Section 4, b.

Table 18

Estimated Input Requirements
for the Naval Surface Armament Installations
of Soviet Cruisers (CL), Sverdlov Class a/

Input	Total Requirements per Vessel
Carbon Steel (Pounds)	956,770
Alloy Steel (Pounds)	2,830,412
Copper Alloy (Pounds)	24,364
Unalloyed Copper (Pounds)	5,092
Foundry Products (Pounds)	283,460
Aluminum (Pounds)	5,582
Tin (Pounds)	28
Rubber (Pounds)	66
Total Material Requirements (Pounds)	4,105,774
Direct Labor (US Man-Hours)	906,440
Coal (Short Tons)	13,568
Petroleum (Gallons)	130,656
Natural or Producer Gas (1,000 Cubic Feet)	40,638
Electric Power (KWH)	5,831,392

a.

Armament 75/	Armament Weight (Pounds)
4 6-inch/50 (estimated) 3-Gun Turrets	1,380,000
6 3.9-inch/56 Twin Mounts	540,000
16 37-mm Twin Mounts	184,000
Total	2,104,000

* Tables 19-25 follow on p. 33-40.

Table 19

Estimated Input Requirements
for the Naval Surface Armament Installations
of Soviet Destroyers (DD), Skoryy Class a/

Input	Total Requirements per Vessel
Carbon Steel (Pounds)	203,415
Alloy Steel (Pounds)	267,017
Copper Alloy (Pounds)	4,042
Unalloyed Copper (Pounds)	878
Foundry Products (Pounds)	39,119
Aluminum (Pounds)	458
Tin (Pounds)	0
Rubber (Pounds)	18
Total Material Requirements (Pounds)	514,947
Direct Labor (US Man-Hours)	201,373
Coal (Short Tons)	1,404
Petroleum (Gallons)	13,519
Natural or Producer Gas (1,000 Cubic Feet)	4,194
Electric Power (KWH)	601,953

a.

Armament 76/	Armament Weight (Pounds)
2 4.8-inch/46 Twin Guns and Mounts	177,000
1 3-inch/55 Twin Gun and Mount	19,600
7 37-mm Single Guns and Mounts	31,000
Total	227,600

Table 20

Estimated Input Requirements
for the Naval Surface Armament Installations
of Soviet Coastal Destroyers (DC), Modified T-41 Class a/

Input	Total Requirements per Vessel
Carbon Steel (Pounds)	103,316
Alloy Steel (Pounds)	136,854
Copper Alloy (Pounds)	2,044
Unalloyed Copper (Pounds)	448
Foundry Products (Pounds)	20,904
Aluminum (Pounds)	232
Tin (Pounds)	0
Rubber (Pounds)	8
Total Material Requirements (Pounds)	263,806
Direct Labor (US Man-Hours)	133,222
Coal (Short Tons)	650
Petroleum (Gallons)	6,262
Natural or Producer Gas (1,000 Cubic Feet)	1,932
Electric Power (KWH)	277,506

a.

Armament 77/	Armament Weight (Pounds)
4 3.9-inch/56 Dual-Purpose Single Guns and Mounts	89,100
6 37-mm Single Guns and Mounts	26,600
Total	15,700

Table 21

Estimated Input Requirements
for the Naval Surface Armament Installations
of Soviet Submarines (SS), Long Range a/ b/

Input	Total Requirements per Vessel
Carbon Steel (Pounds)	21,840
Alloy Steel (Pounds)	70,616
Copper Alloy (Pounds)	2,908
Unalloyed Copper (Pounds)	34
Foundry Products (Pounds)	6,528
Aluminum (Pounds)	0
Tin (Pounds)	0
Rubber (Pounds)	0
Total Material Requirements (Pounds)	101,926
Direct Labor (US Man-Hours)	35,752
Coal (Short Tons)	174
Petroleum (Gallons)	1,686
Natural or Producer Gas (1,000 Cubic Feet)	524
Electric Power (KWH)	75,272

a. Similar to K-1 Class.
b.

Armament 78/	Armament Weight (Pounds)
2 3.9-inch/51 Single, Wet, Open Guns and Mounts	24,800
2 45-mm Single Guns and Mounts	2,248
Total	27,048

Table 22

Estimated Input Requirements
for the Naval Surface Armament Installations
of Soviet Submarines (SS), Medium Range a/ b/

Input	Total Requirements per Vessel
Carbon Steel (Pounds)	1,954
Alloy Steel (Pounds)	4,526
Copper Alloy (Pounds)	24
Unalloyed Copper (Pounds)	4
Foundry Products (Pounds)	438
Aluminum (Pounds)	0
Tin (Pounds)	0
Rubber (Pounds)	0
Total Material Requirements (Pounds)	6,946
Direct Labor (US Man-Hours)	2,024
Coal (Short Tons)	2
Petroleum (Gallons)	24
Natural or Producer Gas (1,000 Cubic Feet)	6
Electric Power (KWH)	872

a. Similar to Shch IV Class.

b.

Armament 79/	Armament Weight (Pounds)
2 45-mm Single Guns and Mounts	2,248

Table 23

Estimated Input Requirements
for the Naval Surface Armament Installations
of Soviet Submarines (SS), Coastal a/ b/

Input	Total Requirements per Vessel
Carbon Steel (Pounds)	977
Alloy Steel (Pounds)	2,263
Copper Alloy (Pounds)	12
Unalloyed Copper (Pounds)	2
Foundry Products (Pounds)	219
Aluminum (Pounds)	0
Tin (Pounds)	0
Rubber (Pounds)	0
Total Material Requirements (Pounds)	3,473
Direct Labor (US Man-Hours)	1,012
Coal (Short Tons)	1
Petroleum (Gallons)	12
Natural or Producer Gas (1,000 Cubic Feet)	3
Electric Power (KWH)	436

a. Similar to MV Class.
b.

Armament 80/	Armament Weight (Pounds)
1 45-mm Single Gun and Mount	1,124

Table 24

Estimated Input Requirements
for the Naval Surface Armament Installations
of Soviet Patrol Craft (PC) a/ b/

Input	Total Requirements per Vessel
Carbon Steel (Pounds)	14,229
Alloy Steel (Pounds)	21,618
Copper Alloy (Pounds)	195
Unalloyed Copper (Pounds)	10
Foundry Products (Pounds)	2,132
Aluminum (Pounds)	0
Tin (Pounds)	0
Rubber (Pounds)	0
Total Material Requirements (Pounds)	38,184
Direct Labor (US Man-Hours)	19,659
Coal (Short Tons)	86
Petroleum (Gallons)	829
Natural or Producer Gas (1,000 Cubic Feet)	252
Electric Power (KWH)	36,177

a. 200 to 300 tons displacement, similar to the Kronshtadt or Artillerist classes.

b.

Armament 81/	Armament Weight (Pounds)
1 3-inch/55 Single, Shielded, Pedestal-Type Gun and Mount	10,913
2 37-mm Single Guns and Mounts	8,860
Total	19,773

Table 25

Estimated Input Requirements
for the Naval Surface Armament Installations
of Soviet Mine Craft a/ b/

Input	Total Requirements per Vessel
Carbon Steel (Pounds)	41,944
Alloy Steel (Pounds)	52,986
Copper Alloy (Pounds)	890
Unalloyed Copper (Pounds)	212
Foundry Products (Pounds)	8,244
Aluminum (Pounds)	116
Tin (Pounds)	0
Rubber (Pounds)	4
Total Material Requirements (Pounds)	104,396
Direct Labor (US Man-Hours)	56,110
Coal (Short Tons)	310
Petroleum (Gallons)	2,984
Natural or Producer Gas (1,000 Cubic Feet)	930
Electric Power (KWH)	133,596

a. Similar to the T-43 Class.
b.

Armament	Armament Weight (Pounds)
2 3.9-inch/56 Single, Shielded, Pedestal-Type Guns and Mounts (average armament of vessels of this class)	44,532

APPENDIX B

GAPS IN INTELLIGENCE

Information is largely unavailable on Soviet naval guns and mounts. Technical reports by trained observers are scarce and often contradict previous reports.

Information of the following kinds would be of particular value:

1. Figures, based on actual measurement of Soviet equipment, concerning gun bore and caliber, armor thickness, mount dimensions, and gun and gun mount weights.

2. Technical descriptions of ammunition loading and handling systems, power drives, gun control systems, gun and mount components, and gun stabilization systems.

3. Material analysis of gun and mount components.

4. Information on manufacturing techniques.

5. Reports on plants producing naval guns and mounts subsequent to 1950, with estimates of the quantity of production.

6. Information on maintenance procedures and spare parts programs.

7. Evidence of stockpiling of naval guns and mounts.

APPENDIX C

SOURCES AND EVALUATION OF SOURCES

25X1C

1. Evaluation of Sources.

The primary sources of information have been finished intelligence reports from CIA and [redacted] military intelligence agencies. Data on US naval weapons was received from the US Navy Bureau of Ordnance and the Naval Gun Factory and is considered reliable.

Little use was made of sources such as prisoner-of-war interrogation reports, because the observers were inexperienced in most instances. These reports rate an over-all evaluation of not higher than possibly true, and were employed only when information from experienced observers was completely lacking.

2. Sources.

Evaluations, following the classification entry and designated "Eval.," have the following significance:

Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which may carry the field evaluation "Documentary"

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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1. Army, G-2, Summary of Intelligence Reference Data, 1 Mar 1954. S. Eval. RR 2.
2. Ibid.
3. Navy, ONI, 32 (R), 1 May 1953. S. Eval. RR 2.
4. CIA/RR PR-47, Inputs for the Peacetime Production of Small Arms, Mortars, and Artillery Pieces in the USSR, 29 Jan 1954. S. Eval. RR 2.
5. Army, Intelligence Review No. 195, Aug 1952. S. Eval. RR 2.
6. CIA, NIE 87. S. Eval. RR 2.
7. CIA, EIC-P-6. S. Eval. RR 2.
8. CIA ORR Project 25.192. S. Eval. RR 2.
9. Navy, ONI, Foreign Naval Vessel Notes, No. 15/53, 10 Jul 1953. S, US OFFICIALS ONLY. Eval. RR 2.
10. Ibid.
11. CIA, TSC No. 031251, Annexes C and D, 5 Oct 1953. S. Eval. RR 2.
12. Navy, Foreign Naval Vessels, op. cit.
13. Navy, ONI, F-32R, Jun 1951. S. Eval. RR 2.
14. Navy, Bu Ord, OP 1112 (2nd Rev.). 7 Mar 1945. R. Eval. RR 1.
15. CIA, TSC No. 031251, op. cit.
16. Navy, Bu Ord, 4 Aug 1953. C. Eval. RR 1.
17. NIS 26, Section 82, Nov 1951. S. Eval. RR 1.
18. Navy, ONI, 32 (R), op. cit.
19. Navy, NA Copenhagen 207-52, 29 Oct 1952. C. Eval. B-2.
20. Navy, ONI, 1-S-52, 1 Apr 1952. S. Eval. RR 2.

25X1C

21. Navy, NA Copenhagen, op. cit.
22. [redacted]
23. Navy, ONI, 1-S-52, op. cit.
24. Ibid.
    NIS 26, op. cit.
    Navy, ONI, F-32R, op.cit.

25. Navy, Foreign Naval Vessels, op. cit.
26. Ibid.
27. CIA, TSC No. 031251, op. cit.
28. Ibid.
29. Navy, ONI 145-S-51, 1 Oct 1951. S, [redacted] 25X1C
Eval. RR 1.
30. Navy, Foreign Naval Vessels, op. cit.
31. Navy, Bu Ord, OP 1112, op. cit.
32. CIA, TSC No. 031251, op. cit.
33. Navy, ONI, F-32R, op. cit.
34. Handbook of Ships' Characteristics, Red Banner Baltic Fleet, 1940. S. Eval. RR 2.
35. Navy, ONI, F-32R, op. cit.
36. Handbook, op. cit.
37. Navy, ONI, The Soviet Navy, 15 Feb 1951. C. Eval. RR 2.
38. Handbook, op. cit.
39. Navy, Bu Ord, OP 1112, op. cit.
40. Navy, ONI, F-30-SD Annual Report, 1 Oct 1952. S. Eval. RR 2.
Navy, ONI, F-32R, op. cit.
41. The Soviet Navy, op. cit.
42. Handbook, op. cit.
43. The Soviet Navy, op. cit.
44. Ibid.
45. Handbook, op. cit.
46. Navy, Bu Ord, OP 1112, op. cit.
47. CIA, TSC No. 031251, op. cit.
48. Ibid.
25X1A 49. Navy, Bu Ord, OP 1112, op. cit.
50. [redacted]
51. Navy, ComNavGer 452-S-52, Oct 1952. S. Eval. RR 3.
52. Navy, ONI, 32 (R), op. cit.
53. Ibid.
54. Defense, Munitions Board Requirements Manual, 1 Jul 1951. U. Eval. RR 2.
55. Ibid.
56. Ibid.
57. CIA/RR PR-47, op. cit.
58. Machinery, London, England, 30 Oct 1953. U. Eval. RR 3.
59. Navy, Bu Ord, Engineering Estimates on Materials, 1942-45. C. Eval. RR 1.
60. CIA/RR PR-47, op. cit.
61. CIA/RR PR-47, op. cit.
62. CIA/RR PR-47, op. cit.

63. Handbook, op. cit.
64. CIA/RR PR-47, op. cit.
65. Handbook, op. cit.
66. CIA/RR PR-47, op. cit.
67. CIA/RR PR-47, op. cit.
68. Handbook, op. cit.
69. CIA/RR PR-47, op. cit.
70. Handbook, op. cit.
71. CIA/RR PR-47, op. cit.
72. CIA/RR PR-47, op. cit.
73. Navy, ComNavGer, op. cit.
74. CIA/RR PR-47, op. cit.
75. Navy, ONI, 32 (R), op. cit.
76. Ibid.
77. Ibid.
78. Ibid.
79. Ibid.
80. Ibid.
81. Ibid.

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